NMFS Pacific Islands Region
Electronic Reporting and Electronic Monitoring
Implementation Plan

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Acronyms

ACL	annual catch limit
BSP	Bureau of Statistics and Plans (Guam)
CNMI	Commonwealth of the Northern Mariana Islands
Council	Western Pacific Fishery Management Council
CREMUS	Coral Reef Ecosystem Management Unit Species
DAWR	Division of Aquatic and Wildlife Resources (Guam)
DFW	Division of Fish and Wildlife (CNMI)
DMWR	Department of Marine and Wildlife Resources (American Samoa)
EM	electronic monitoring

ER	electronic reporting
ET	electronic technology
EEZ	Exclusive Economic Zone
FBSAB	Fisheries Biology and Stock Assessment Branch
FEP	Fishery Ecosystem Plan
FFA	Pacific Islands Forum Fisheries Agency
FIS	Fisheries Information System (NMFS)
FMB	Fisheries Monitoring Branch
FMP	Fishery Management Plan
FTE	Full Time equivalent
HDAR	Hawaii Department of Aquatic Resources
IATTC	Inter-American Tropical Tuna Commission
IFP	International Fisheries Program
MUS	Management Unit Species
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFR	Online Fish Report System (Hawaii)
OLE	NOAA Office of Law Enforcement
PILOT SEA TO AIR	Pacific Islands Longline Observer Transition to Safety-Enhancing, Automated, Timeliness-Optimized and Accurate Information Reports
PIR	Pacific islands region
PIRO	Pacific Islands Regional Office
PIFSC	Pacific Islands Fisheries Science Center
QA/QC	quality assurance/quality control
RFMO	Regional Fisheries Management Organization
SAP	Stock Assessment Program
SFD	NMFS Sustainable Fisheries Division
SPTT	South Pacific Tuna Treaty
VMS	Vessel monitoring system
WCPFC	Western Central Pacific Fisheries Commission
WCPFCIA	Western and Central Pacific Fisheries Convention Implementation Act
WCPO	Western and Central Pacific Ocean
WPacFIN	Western Pacific Fisheries Information Network
WPFMC	Western Pacific Fishery Management Council

Introduction

The National Marine Fisheries Service (NMFS) is committed to the use of electronic technologies in fishery-dependent data collection to collect timely, cost-efficient data needed to manage US federal fisheries. Electronic technologies include the use of vessel monitoring systems (VMS), electronic logbooks, video cameras, and other technologies that provide electronic reporting (ER) and electronic monitoring (EM). The demands for more precise, timelier, and more comprehensive fishery-dependent data continue to rise. Constrained budgets and increasing demands for data are driving the need to evaluate and improve existing fishery-dependent data collection programs. Evaluating and improving data collection programs includes addressing cost-effectiveness, economies of scale, and sharing of electronic technology solutions that can be employed to address regional and multi-regional fishery data needs.

The implementation of fisheries management regulations that require near real-time monitoring of catch by species at the vessel level has challenged the methodological and budgetary limits of data collection methods. Current data collection methods may include self-reporting, on-board observers, and dockside monitoring. In May 2013, NMFS issued Policy Directive 30-133, *Policy on Electronic Technologies and Fishery-Dependent Data Collection*, which called for the development of Regional Electronic Technology Implementation Plans to address regionally specific fishery-dependent data collection issues and electronic technologies to address these issues. The Policy Directive did not state that electronic technologies were appropriate for all of a region's fisheries or fishery management plans. Rather, it called for the identification of fisheries or fishery management plans for which electronic technologies are appropriate. In response to the directive, and in consultation with the Western Pacific Fishery Management Council (Council), the Pacific Islands Regional Office (PIRO) and Pacific Islands Fisheries Science Center (PIFSC) have developed this ER/EM implementation plan to guide the use of ER/EM for fisheries management in the Pacific Islands Region.

Background

The objective of monitoring fisheries catch is to provide information necessary for effective and efficient analysis and management of federal fisheries. Catch and bycatch information can be used for stock assessments of target species to understand the impacts of the fisheries on the stocks and to provide the basis for setting and tracking compliance with acceptable biological catches and annual catch limits (ACLs). Fisheries-dependent data are used to determine the effectiveness of management of the fisheries and to prevent overfishing while achieving optimum yield.

Before consideration of ER and EM at the regional level, we should identify the technical and financial capabilities of the fishermen and dealer facilities, the existing agency data management needs and resources, and the current partners and processes used for data management. These capabilities would be fishery and location specific. ER and EM would require capabilities and support at both the sending and receiving ends of the data flow. As identified in the findings of the Council's 2008 Ecosystem Workshop, we need to be careful to collect data that will inform our ecosystem-based management and not burden fishermen with providing data that may not be useful to the agency for fisheries management (WPFMC 2008).

ER and EM can provide near real-time reporting of fisheries catch, effort, and location of fishing activities, and EM also can enhance safety at sea. Near real-time data collection would be less

important for a fishery that is not likely to reach its ACL based on historical activity. Near real time reporting would be more important for fisheries that are managed using in-season closures. The more timely and reliable the data, the more flexibility the agency may have to work with the fishermen in managing the fishery. In addition, we should consider the effective collection of fishery-dependent data that may depend on where resources to support ER exist (i.e., at the vessel level or dealer level).

Data Reporting and Management Authorities

Current fishery-dependent data collection methods and needs, specific to each managed fishery, should be understood before planning changes to how these data are collected and reported. Since 2007, NMFS has the authority for electronic collection of information from the federally-managed fisheries. The five Fishery Ecosystem Plans (FEPs) developed by the Council provide the authority for data collection and reporting regulations at 50 CFR 665.14. The plans are available from the Council's website at http://www.wpcouncil.org/fishery-plans-policies-reports/. The specifics of what and how data are reported are provided by the NMFS Pacific Islands Region Regional Administrator on forms used to collect and report fisheries data. In general, the FEPs do not have specific goals described for fishery-dependent data collection or monitoring. All of the FEPs have been amended to allow electronic logbooks (elogbooks) for fisheries. The following is how reporting is addressed in each FEP.

American Samoa FEP: Sections 5.5.2 and 5.6.2 allow for the use of NMFS elogbook to report Crustacean MUS catch, and catch under coral reef ecosystem or potentially harvested coral reef taxa special permits. Section 8.2.1.8, discusses collection of bycatch information from creel surveys, for fishery wide bycatch estimations and to support stock assessments. Sections 5.3.3 and 5.5.5 address at-sea observer coverage for bottomfish and crustacean fisheries, respectively.

Hawaii FEP: Section 5.3.2 allows for elogbooks for non-commercial bottomfish fishing. Commercial bottomfish fishery participants are required to use the Hawaii Department of Aquatic Resources (HDAR) ER. Sections 5.4.2 and 5.5.1 allow elogbooks for reporting crustacean and precious coral catch, respectively. Section 5.6.1 allows elogbooks for reporting coral reef ecosystem fisheries under special permits. Section 8.2.8 discusses bycatch reporting by State and federal requirements. Sections 5.3.4 and 5.4.11 address at-sea observer coverage for bottomfish and crustacean fisheries, respectively.

Mariana Archipelago FEP: Sections 5.3.1 and 5.4.1 allow for the use of elogbooks for reporting bottomfish catch by vessels greater than 50 ft and precious coral catch, respectively. In section 5.5.2, reporting is needed to collect harvest and effort data. Federal logbooks are used for Crustacean MUS in EEZ waters around Guam and the Commonwealth of the Northern Mariana Islands (CNMI), and elogbooks are allowed. In Section 5.6.1, coral reef ecosystem fisheries are allowed to use elogbooks. Sections 5.3.3 and 5.5.5 address at-sea observer coverage for bottomfish and crustacean fisheries, respectively.

Pelagic Fisheries FEP: Section 5.2 discusses the use of the logbook program and observer program to obtain accurate reporting of pelagic catches in the longline fishery. Amendment 7 to the Pelagic Fishery Management Plan (FMP) in 2007 included elogbooks that can collect and report fisheries dependent data in a manner that improves data accuracy and results in significant time savings for both fishermen and NMFS. The FMP was converted into an FEP in 2009.

Pacific Remote Islands Area FEP: Sections 4.4.1, 5.4.1, and 5.5.2 state that logbook reporting is used to collect adequate harvest and effort data. Elogbooks are permitted in sections 5.3.2 and 5.5.2 for the bottomfish and crustacean fisheries, respectively. Section 5.6.2 allows elogbooks for reporting coral reef ecosystem fisheries under special permits. Sections 5.3.4 and 5.5.4 address at-sea observer coverage for bottomfish and crustacean fisheries, respectively.

Even though the FEPs allow electronic reporting using elogbooks, none of the fisheries managed are currently using this method of reporting fisheries information.[1] Likewise, even though several of the fisheries have provisions for observers, only the pelagic longline fisheries are observed at this time due to funding limitations.

Information on the authorities for U.S. purse seine fishery data management is in Appendix A.

NMFS Data Management

The fishery-dependent data collected for management of the Pacific islands region (PIR) federal fisheries involves coordination among State, Territories, international commissions (Western and Central Pacific Fisheries Commission (WCPFC) and Inter-American Tropical Tuna Commission (IATTC)), NMFS, and the Western Pacific Fisheries Information Network (WPacFIN). Data received by NMFS is managed by the PIFSC. The information collected is used to support stock assessments and management of PIR fisheries.

The PIFSC Fisheries Biology and Stock Assessment Branch (FBSAB) conducts stock assessments for species managed under FEPs. The FBSAB has a Stock Assessment Program (SAP) and a Life History Program which conduct research to improve stock assessments and to advise domestic and international resource managers at both the species and ecosystem levels. Using biological field data, laboratory investigations on life history, fishery-dependent data, assessment survey cruises, and population modeling, the SAP conducts stock assessments and estimates bycatch and fishery interactions with protected species.

The PIFSC also has a Fisheries Monitoring Branch (FMB) that provides fisheries-dependent data, fishery reporting, technical support, and advice in support of federal and international fisheries management in the Pacific Islands. Fisheries monitoring data include many new data collections as well as legacy databases crucial to fisheries management. The FMB is comprised of an Insular Fisheries Monitoring Program (IFMP) and an International Fisheries Program (IFP). To address the fishery monitoring requirements of the Magnuson-Stevens Act, FMB collects, validates, and processes fishery-dependent information. IFMP collaborates with local fishery agencies throughout the U.S. Pacific Islands to provide support for insular fisheries stocks. IFP uses federal fishery logbook and observer programs to provide support to federal fisheries such as the Hawaii and American Samoa longline fisheries. FMB summarizes these data to provide reports on all federally managed fisheries, and to report on all highly migratory species fisheries to international fishery management organizations. IFP also conducts a program that consults on, encourages, or investigates testing of alternative fishing technologies to reduce bycatch and interactions with protected species, including testing cameras on-board commercial or contracted fishing vessels, primarily in foreign fisheries (e.g., Mexico and Indonesia).

[1] In the mid-2000s, PIFSC conducted a pilot project to test electronic reporting in the Hawaii longline fleet.

Together, FBSAB and FMB collect, assimilate, organize, maintain, summarize, and analyze the fundamental data (e.g., catch, effort, size composition, life history characteristics) for evaluating the sustainability of federally and internationally managed fish stocks. They also distribute data summaries and analytical results to regional fishery regulatory agencies and entities. Data on the various fish stocks are primarily fishery-dependent, i.e., data are collected during the course of fishing operations, and come from a wide variety of sources including logbooks and reports provided by fishermen, scientific observers placed on fishing vessels, seafood dealers, dockside intercept sampling, etc. Some of this information is directly generated by PIFSC personnel, and the remainder is provided by partner agencies; however, data assimilation and management mostly occurs within PIFSC.

PIFSC maintains the record-level databases containing information such as species-specific catches by license holder, date, location, gear, etc., from which all data products and analyses are derived. For the major types of fishery-dependent information (e.g., longline observer data, fisher-reported catch and effort data), the elemental databases are fairly well-organized, but are mostly maintained as separate entities and, thus, not part of a centralized, center-wide enterprise database system. A key source of frustration to PIFSC scientists responsible for analyzing these data is the difficulty of accessing the various types of fishery-dependent information. For example, there may be one resident expert for a particular type of data who is responsible for extracting and providing information to analysts within PIFSC, rather than a single system for analysts to retrieve data for themselves. Great strides have been made in recent years to catalogue all of the extant fishery-dependent data at PIFSC, but access in a timely manner remains an issue.

Figure 1 shows the flow of data from the fisher through the PIFSC data management system for the Hawaii-based longline fisheries. Notice that three sources of fisheries dependent data need to be processed to understand the catch and effort for this fishery (trip logbooks, observer trip data and dealer data). This use of multiple sources of data also applies to the Hawaii bottomfish fishery. More details on the interconnection between the various datasets and how these data are used for fisheries management is in WPFMC (2008).

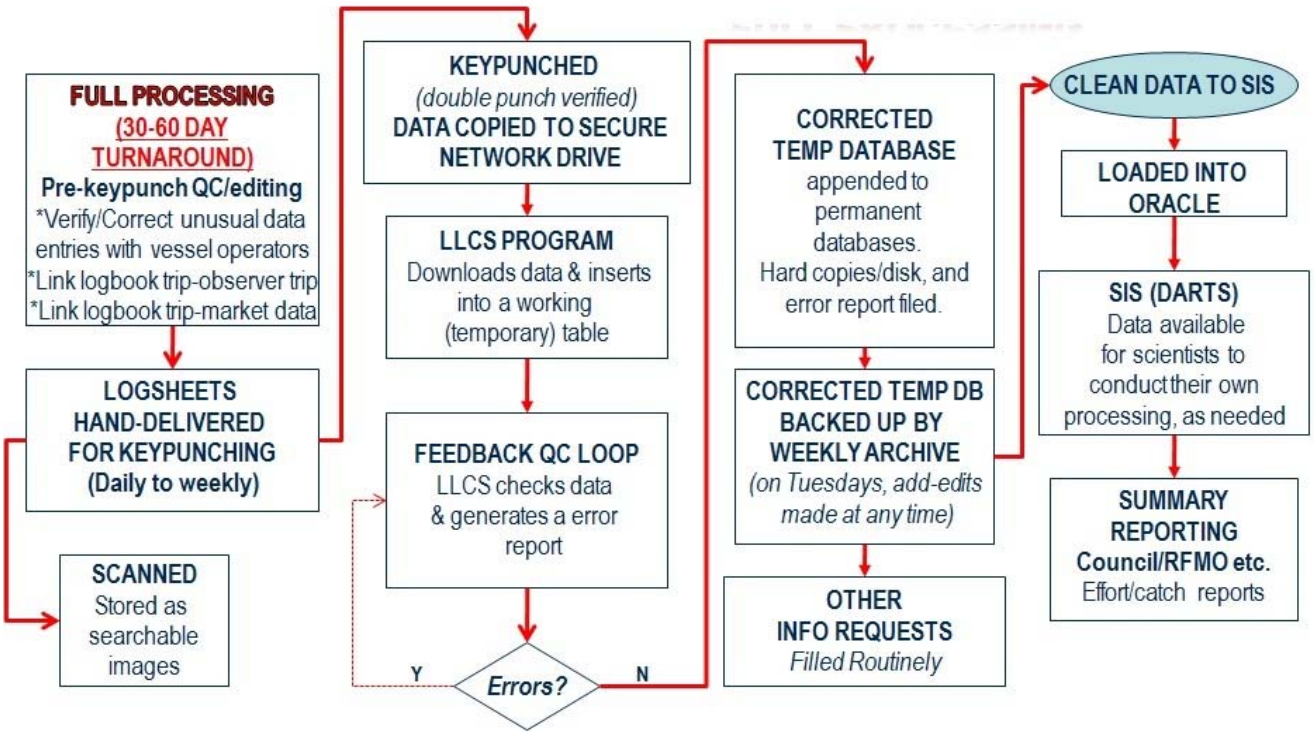

Figure 1. Hawaii Longline Fisheries-Dependent Data Processing

PIFSC scientific data management systems and capabilities were externally reviewed during July 20-22, 2010. The principal objective of the review was to evaluate PIFSC's approach to management of its scientific data. The report from this review identified improvements that should be considered to meet PIFSC's mission for data integration and dissemination to a variety of stakeholders and the general public. The first priority is the primary fishery-dependent databases used to conduct stock assessments and provide data summaries and assessment results to stakeholders responsible for management policies. Major tasks include: (i) transitioning the elemental databases into the center-wide enterprise database system, along with the necessary tools for easy input and extraction of data into and from the database; (ii) creating tools to facilitate production of standard data summaries and assimilation into a summary database system with easy access for stakeholders; (iii) clearly documenting the various databases and intermediate processing steps used in creating summary products to make the origins of any dataset or data product transparent to users. The principal data users (e.g., stock assessment analysts, fisheries managers) need to be involved at various stages of the transition process to ensure ease of access to databases and data summary products.

The transition process for fishery-dependent data described above includes documenting the procedures for producing standard types of data summaries. A parallel activity needs to begin that documents the creation of analysis-ready datasets used to conduct stock assessments and used for fisheries management, including data processing code and description of intermediate datasets and analyses. The documentation should be thorough enough so that an independent analyst and fisheries managers can easily reproduce a given analysis-ready dataset from the original source databases, and it should be clear enough so that the main processing steps/decisions are transparent. Priority should be given to ongoing stock assessments for highly migratory species and bottomfish, and to target species with harvests that are likely to reach or exceed an ACL, over any future stock assessments. The final analysis-ready datasets should be added into the center-wide enterprise database system. These improvements to current data management capabilities should be considered with the implementation of any new ER or EM effort so that improvements in data receipt, management, and use can be achieved.

Western Pacific Fisheries Information Network (WPacFIN)

Since 1981, the WPacFIN program provides access to fisheries data from the Pacific Islands Region to support fisheries management in that region. It obtains these data through cooperative agreements with participating state and territorial fisheries agencies in Hawaii, American Samoa, the CNMI, and Guam. It also works closely with the Council and PIRO. Data obtained by WPacFIN are used in the setting of ACLs in the region. The following describes the fisheries data programs in the Pacific Island territories and the State of Hawaii.

The American Samoa Department of Marine and Wildlife Resources (DMWR) is located near Pago Pago on Tutuila and has been collecting commercial fisheries data from the Tutuila fleet since the early 1970s. In 1983, it extended its coverage to the Manua Islands, and in 1985 DMWR modified its data collection programs to include recreational and subsistence fisheries data.

The CNMI Division of Fish and Wildlife (DFW) has been collecting fisheries statistics on the commercial fishing fleet of Saipan since the mid-1970s. In 1983, DFW also began collecting information on vessels transshipping tuna out of Tinian. Significant improvements to the data collecting and processing systems were made in 1982 when computer hardware, software, and training were provided by the WPacFIN program.

The Guam Division of Aquatic and Wildlife Resources (DAWR) has been conducting offshore and inshore creel surveys since the early 1970s. Beginning in 1982, DAWR began modifying data collection and processing systems to improve estimates of catch and effort by improving sampling techniques and by incorporating the use of computers to expand the survey data. In 1982, WPacFIN began working with DWF staff and local fish dealers to obtain information on commercial landings through voluntary use of trip ticket invoices provided by WPacFIN.

Since 1988, the Guam Bureau of Statistics and Plans (BSP) has administered the large-scale fishery data collection system to monitor and study the volume of tuna being offloaded and transshipped through Guam. The system was first developed by the South Pacific Commission and is currently supported by the PIFSC. In 1989, to further the analysis and determine the impact of the longline fishery, WPacFIN provided a supplemental data processing program to the Guam BSP to register individual weights by species.

The Hawaii Division of Aquatic Resources (HDAR) has been collecting data from commercial fishermen since 1948. HDAR manages the state's aquatic resources and ecosystems through programs in commercial fisheries, aquatic resources protection, habitat enhancement, and recreational fisheries. WPacFIN has worked in close collaboration with HDAR since 1981 and provides technical, data processing, and quality control support. These data collection programs are designed as major tools for local offices in monitoring of pelagic fisheries- such as troll, handline and longline; bottomfish fisheries- deep and shallow; reef fisheries- spear, hook and line, gleaning, net and trap; and crustacean fisheries- lobster and shrimp.

Long-term fishery data collection programs managed by WPacFIN are:

- Offshore (boat-based) Creel Survey (implemented in all islands),
- Inshore (shore-based) Creel Survey (implemented in all islands),
- Commercial Trip Ticket Invoices or Purchase System (implemented in all islands),
- Foreign Longline Tuna Transshipment (Guam),
- Community-based Fishermen Volunteer Fish Catch Reporting (Guam),
- Cannery landings (American Samoa),
- Federal Longline Logbooks (American Samoa),
- Imported Fish (CNMI),
- Local Boat Registrations (CNMI, American Samoa, and Hawaii), and
- Fishermen and Dealer Reporting (Hawaii),

The following are some of the data management duties that WPacFIN performs:

- Maintain and store copies of data at WPacFIN central to serve as a secondary off-site data archive,
- Serve as a conduit to distribute and share data between cooperating agencies,
- Provide data summaries in response to data requests from NMFS Headquarters, the Council, NMFS PIRO, PIFSC, and other agencies,
- Annual production of the "Fisheries Statistics of the Western Pacific" publication
- Provide summary statistics of the Pacific Islands module in the "Fisheries of the United States" report,
- Provide data summary sections or modules from each of the WPacFIN islands for the annual Pelagic, Bottomfish, and Coral Reef Plan Team Reports published by the Council, and
- Provide the public timely data summaries on the WPacFIN web site.

Additional information on the state and territorial fisheries data collections are available from WPFMC (2008). Information on the U.S. purse seine fishery data management is in Appendix A.

Technological capabilities

In the late 1990s, commercial lobster vessels fishing in the Northwestern Hawaiian Islands reported their catch, effort and other information via standardized email to PIRO using the VMS. This limited trial was the first application of ER in a PIR fishery.

In 2004, elogbooks were trialed on a few vessels for catch and effort data by Hawaii longline fishermen, but this reporting method was not widely accepted and was abandoned[2]. The use of elogbooks made the pre-keypunch quality control and editing process much faster[3] and eliminated the need for keypunching. PIFSC is improving the timeliness of predicting catch in relation to the harvest limits by fast tracking data into the data management system that meets certain data quality checks.[4] The timeliness of forecasting harvests could be further improved by receiving at-sea catch information, which is a need that ER could achieve.

No federal ER is currently used for PIR fisheries, but there is interest in developing this technological capability. The goals of ER for PIRO Observer Program are to systematically move towards efficient paperless data collection, optimize timeliness and accuracy of data collection, and reduce program costs over the long term. To meet these goals, a coordinated ER/EM project is in process for the Hawaii longline fisheries, as further explained below.

In FY 2014, a partnership formed among the Council, PIFSC, PIRO Sustainable Fisheries Division (SFD), PIRO Observer Program, and NOAA OLE, and initiated a project that integrates ER/EM for the Hawaii longline fisheries using VMS to securely transmit observer and logbook information from the fishing vessel. The project will supply the entire Hawaii longline fleet (approximately 140 vessels) with new VMS units and tablet computers equipped with ER software. The tablet computers are interfaced with the VMS units by Bluetooth technology. Captains will use the tablets to send daily logbook information through the VMS unit via satellite to PIFSC. One project component is The *Pacific Islands Longline Observer Transition to Safety-Enhancing, Automated, Timeliness-Optimized and Accurate Information Reports (PILOT SEA TO AIR)* which supplies the PIRO Observer program with tablet computers capable of sending daily observer logbook information via VMS technology for longline fisheries in Hawaii and American Samoa. Currently, real-time at-sea ER to NMFS from observers is limited to interactions with sea turtles and marine mammals through a satellite phone. The project will save time for fishermen and NMFS, improve data accuracy, and improve the tracking of catch quotas.

As explained in the Background section, WPacFIN receives ER from the State, territories, and dealers. HDAR currently has a web-based Online Fish Report System (OFR) in operation. This system was implemented in February 2010. The intent was to allow the online submission of the generic monthly Fishing Reports. This successful implementation was followed by the Main Hawaiian Island Deep 7 Bottomfish (BF) Fishing Trip Report in September 2011. The OFR adoption rate by commercial marine license (CML) holders has risen since implementation and is currently at 68 percent for the required monthly Fishing Report and 75 percent for the BF Trip Report.

HDAR is currently modifying the OFR to allow the online submission of the rest of the fishery specific forms with the exception of the Aquarium Fish Report. The timeline for the modification

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[2] Personal Communication, Russell Ito, PIFSC, October 9. 2014

[3] Personal Communication, Walter Machado, PIFSC, October 9, 2014

[4] Fast Track Monitoring of U. S. Longline Bigeye Tuna Catches in the Western-central Pacific Ocean, Powerpoint presentation, PIFSC, May 13, 2011.

is early 2015. The State OFR includes catch data for some federally-managed fisheries (bottomfish, precious corals, non-longline commercial pelagic, and shrimp trap). The development of any federal ER system should be coordinated with the State, and should enhance the existing capabilities of the HDAR ER system rather than duplicate it. Federal fishery-dependent logbook data are currently manually entered into the PIFSC computer systems from logbooks provided by fishermen.

In support of the NMFS ER/EM initiative to improve the timeliness and accuracy of fishery reporting, NOAA published in 2009 a notice in the *Federal Register* describing the certification process and requirements for vendors wishing to supply Pacific Island fishing vessel owners and operators with elogbook applications. The notice can be found at https://www.federalregister.gov/articles/2009/07/07/E9-15958/fisheries-in-the-western-pacific-certification-requirements-for-electronic-logbook-applications. Copies of the NOAA Fishery Information System (FIS) Electronic Logbook Certification Guidelines (Certification Guidelines) and requests for certification of e-log applications are managed by: Electronic Reporting System Manager, PIFSC, NMFS, 1845 Wasp Blvd., Building 176, Honolulu, HI 96818-5007.

In 2009, the Council, PIRO, and PIFSC developed draft guidelines for the certification of an application software (E-Log-App) for ER for Hawaii longline vessels (NMFS PIFSC 2009). The reporting and recordkeeping rules for Pacific Island fisheries (50 CFR 665.14 – Appendix 1) were modified in 2007 to give fishermen the option to submit elogbook forms. The guidelines were intended to assist vendors in providing electronic reporting services (elogbooks) that would meet the needs of the PIFSC, NOAA OLE and PIRO SFD in management of the fisheries. The E-Log-App includes components that gather logbook data (e.g., data entry), generate elogbooks, and view logbook data on the application's database and the elogbook. The ER for longline fisheries project is currently applying this certification process to the application software that will be used for their elogbooks project for the Hawaii longline fisheries.

In 2009, the Council conducted a pilot study to explore the use of EM in the shallow-set and deep-set Hawaii longline fisheries. EM systems, consisting of closed circuit television cameras, sensors (e.g., GPS, hydraulic pressure and winch rotation) and a system control box, were deployed on three vessels, simultaneously monitored with observers, for a collective total of about 320 sea days, 13 fishing trips and 182 fishing events. Overall, the equipment performed well, recording data for 99.2% of the time vessels were at sea. A key strength of EM is the continuous sensor data record providing very accurate temporal and spatial information on gear setting and retrieval activities. EM image reviewers were also able to reliably detect hooks deployed and retained catch. About 40% of the discard catch was not detected by EM image reviewers because discard releases occurred outside the camera field of view. Overall, EM species identifications were more general than by observers and most common species were identified from EM imagery. Detection of protected species by EM and observers was similar, with both detecting all sea turtles encountered and each missing one of three caught. The shortcomings of EM for detecting discards (bycatch) could be addressed by improvements to camera placements, camera technology, and harmonizing crew activities with the system. Implementation of this method of EM for the longline fishery has not been pursued primarily due to unknown costs of implementation and how the system would be integrated with the existing observer program.

Currently, EM in the PIR is limited to VMS. This technology allows the agency to monitor vessel activities in locations where patrolling may be difficult or cost-prohibitive. VMS is required for:

- Hawaii longline;
- American Samoa longline;
- Vessels permitted to fish in Crustacean Permit Area 1; and
- Large and medium CNMI bottomfish vessels.

For the above vessels, the VMS units are owned and installed by NMFS, and routine (identity and location) transmission charges are paid by the agency. These requirements are also reflected in Column 2 of Table 1. VMS is also required for vessels fishing in the South Pacific Tuna Fisheries under 50 CFR 300.45 and vessels targeting Highly Migratory Species in the WCPFC under 50 CFR 300.319.

Appendix A contains descriptions of current technological capabilities for ER and EM in the U.S. purse seine fishery.

Future Direction for ER and EM for Pacific Islands Regional Fisheries

A number of questions should be answered to plan implementation of ER or EM for a fishery. These include:

- Are the vessels big enough to install/power the equipment?
- Is there internet/communications infrastructure to support the ER and EM?
- What kinds of data are needed (format and frequency)?
- Is there enough participation in and revenue from the fishery to make ER or EM cost effective to develop and implement?
- How close does catch come to the ACL? (is there a need for immediate reporting)?
- What is the capability of the agency to process the electronic information?
- What type of fishery management is used (catch shares, race for fish, etc.)?
- Does NMFS have the regulatory authority to collect and use these data for management?
- Is there a feasible method of ER or EM that would meet the data needs of NMFS?
- Is there stakeholder and Council agreement to use the ER and EM?
- Could EM be used to supplement existing human observer program in a cost effective manner?
- Is funding available to provide equipment and transmission to fishery participants and support the agency's management of the data?

Each fishery managed by the Council and NMFS has unique characteristics that should be considered and will likely result in varied answers to the questions above. Each fishery should be evaluated based on these questions to determine which fisheries are the best candidates for using EM and ER and to prioritize implementation of electronic technologies.

Applying ER would be most effective for fisheries with enough participation that fishing activity needs to be controlled to prevent exceeding ACLs. Based on 2013 catch data and 2014 ACLs, these fisheries may include the Hawaii deep-set longline, deep 7 bottomfish, non-deep 7 bottomfish, octopus, and crab Coral Reef Ecosystem Management Unit Species (CREMUS) fisheries; and the Guam CREMUS bigeye scad, mullet, and reef shark fisheries. These fisheries would need to be further evaluated to determine if they are good candidates for ER and EM. Most non-commercial and recreational fishing vessels in the PIR are not likely candidates for the use of ER and EM due to no or very low participation, small vessel size, and lack of computer or electronic capabilities.

Table 1 provides a list of fisheries managed by the Council and NMFS and the potential use of ER and EM. For data currently collected in the fisheries, the data quality depends on data type, and data quality varies over time (WPFMC 2008). As illustrated in Table 1, the use of ER/EM in PIR fisheries is limited at this time. The majority of ER/EM used in the PIR is in the Hawaii fisheries as the majority of participation, the economic value of the regional catch, and the volume of data to manage is concentrated in this portion of the Region's fisheries. ER is currently used by HDAR for Hawaii bottomfish, precious corals, deep water shrimp, western Pacific squid jig, and non-longline commercial pelagic fisheries. Federal ER is being concurrently developed by the PIRO Observer Program for observer reporting in Hawaii and American Samoa longline fisheries and PIFSC for elogbooks for Hawaii longline fisheries initially with further expansion anticipated for the American Samoa longline fisheries. ER could be further explored for those Hawaii-based fisheries that can take advantage of the ER infrastructure maintained by HDAR. EM is being tested in several fisheries (e.g., Mexico, Australia, and Indonesia) as described above in the Technological Capabilities Section.

Table 1. Pacific Islands Region Federal Fisheries Data Collection Methods and ET Capabilities and Limitations

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
American Samoa bottomfish	American Samoa DMWR offshore creel survey	ER would be challenging due to technical and infrastructure limitations within this small number of small-sized vessels. The computer literacy and availability of a computer (or other e-reporting system) of the participants are not optimum.	Typical bottomfish fishing vessels in use are mainly 28-32 ft alia vessels. Difficult to mount any kind of camera or other monitoring system. Limited power supply on small vessels. EM systems for this small-sized fleet, with small numbers and intermittent fishing activities, would not be cost effective nor feasible. No observer coverage at this time.	The number of participants in this fishery has historically been very low and existing level of participation is around ten small vessels. The costs to produce, train fishery participants, and implement an ER-EM system would be prohibitive due to the small numbers of participants.

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
American Samoa lobster	logbooks	ER would be challenging due to technical and infrastructure limitations within this small number of small-sized vessels. Most participants do not own a boat, but may rent from an alia owner. Others do not use a boat and may fish from shore at night. The computer literacy and availability of a computer (or other e-reporting system) of the participants are not optimum.	Typical vessels in use are mainly small "trailer-able" or alia vessels. Difficult to mount any kind of camera or other monitoring system. EM systems for this small-sized fleet, with small numbers, would not be cost effective nor feasible. No observer coverage at this time.	The number of participants in this fishery has historically been very low such that the costs to produce, train fishery participants, and implement an ER-EM system would be cost prohibitive. Also the harvest is done by hand and not traps. Trapping for spiny lobsters in A. Samoa is not feasible, so large vessels needed to carry lots of traps are not likely entrants into this fishery.
American Samoa Pelagic Longline Fishery	Logbooks **VMS on vessels over 50 feet.** Observers for vessels over 40 feet	ER is feasible for the longline fishery; however, only the larger-sized vessels (such as those currently utilizing VMS) would be able to host a computer system and conduct ER. Smaller sized alia vessels would not be practical for conducting ER.	Review the 2009 HI Longline EM study and current EM longline trials in Australia and the Solomon Islands to ascertain the potential application to the American Samoa longline fishery.	Current level of observer coverage is approximately 20%. Included in PILOT SEA TO AIR project, testing after HI longline fisheries.

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
American Samoa troll	American Samoa DMWR offshore creel survey	ER would be challenging due to technical and infrastructure limitations within this small number of small-sized vessels The computer literacy and availability of a computer (or other e-reporting system) of the participants are not optimum.	Typical trolling vessels are mainly 28-32 ft alia vessels. Difficult to mount any kind of camera or other monitoring system. EM systems for this small-sized fleet, with small numbers and sporadic/intermittent fishing activities, would not be cost effective nor feasible.	Around 20 small vessels currently participating in the fishery.
CNMI Bottomfish	Logbooks, Sales reports for commercial fishermen **VMS for large and medium vessels**	ER would be challenging due to technical and infrastructure limitations within this small number of small-sized vessels. The computer literacy and availability of a computer (or other e-reporting system) of the participants are not optimum.	Typical vessels in use are mainly small “trailerable” or alia vessels. Difficult to mount any kind of camera or other monitoring system. EM systems for this small-sized fleet, with small numbers, would not be cost effective nor feasible.	Approximately 100 small vessels participating in the fishery. Participation by large and medium vessels is rare as one to four vessels have had VMS in the past, but fishing is very intermittent.

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
CNMI lobster	Creel survey, or logbooks for Federally permitted fishermen	ER would be challenging due to technical and infrastructure limitations within this small number of small-sized vessels. The computer literacy and availability of a computer (or other e-reporting system) of the participants are not optimum.	Typical vessels in use are mainly small “trailerable” vessels. Difficult to mount any kind of camera or other monitoring system. EM systems for this small-sized fleet (zero) with small numbers would not be cost effective nor feasible.	No permits issued at this time.
CNMI troll	Creel survey	ER would be challenging due to technical and infrastructure limitations within this small number of small-sized vessels. The computer literacy and availability of a computer (or other e-reporting system) of the participants are not optimum.	Typical vessels in use are mainly small “trailerable” or alia vessels. Difficult to mount any kind of camera or other EM system. EM systems for this small-sized fleet with small numbers and sporadic/intermittent fishing activities would not be cost effective nor feasible.	

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
CNMI longline	logbooks	ER may be challenging due to technical and infrastructure limitations within the small number of small-sized vessels. Recent participation by larger vessels from the Hawaii Longline fleet make ER feasible for harvest by the large vessels. The computer literacy and availability of a computer (or other e-reporting system) of the participants located in the CNMI are not optimum.	Review the 2009 Hawaii longline EM study and current EM longline trials in Australia and the Solomon Islands to ascertain the potential application to the CNMI longline fishery.	Historically low to no activity. One vessel currently permitted. Mostly outside vessels (from Hawaii) prospecting the resource. If so, then a larger vessel could support ER/EM. Local vessels are not active in this type of fishing. Low to no effort indicates that this would not be feasible nor cost effective.
Guam Bottomfish	Logbooks for large vessels (≥ 50 feet LOA), creel survey for smaller vessels	Internet and telecommunications capability have been improving and potentially could support ER.	Vessels over 50' are required to obtain permits. Vessels this size should be able to host an EM system but the low level of large vessel fishery participation is not cost effective nor feasible.	Two large vessels currently permitted.

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
Guam longline	logbooks	Internet and telecommunications capability have been improving and potentially could support ER.	Review the 2009 Hawaii longline EM study and current EM longline trials in Australia and the Solomon Islands to ascertain the potential application to the Guam longline fishery.	Historically low to no activity. One vessel currently permitted. Occasionally outside vessels (from Hawaii) prospecting the resource. If so, then a larger vessel could support ER/EM. Local vessels are not active in this type of fishing. Low to no effort indicates that this would not be feasible nor cost effective.
Guam Troll	Creel survey	Internet and telecommunications capability have been improving and potentially could support ER.	Typical vessels in use are mainly small “trailerable” vessels. Difficult to mount any kind of camera or other monitoring system. EM systems for this small-sized fleet, with small numbers, would not be cost effective nor feasible.	

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
Hawaii Deep water Shrimp	Logbook **or State of Hawaii fishing report for state licensed vessels**, creel survey. **VMS required for fishing in Crustacean Permit Area 1.**	Hawaii Division of Aquatic Resources (HDAR) has a web-based ER system.	Vessels range in size from small "trailerable" sizes to large moored vessels. Participation is very low and EM would not be cost effective nor feasible.	Seven vessels currently permitted.
Hawaii Deep-set Pelagic Longline	Daily longline and Transshipment logbooks State Dealer reports Observer data **VMS required**	Previous e-log trials were successful. ER is feasible for the longline fishery and is currently being developed for implementation.	Video monitoring was previously tested but not further pursued at this time. Should review current EM longline trials in Australia and the Solomon Islands to ascertain the potential application to the Hawaii longline fishery.	138 vessels permitted for longlining. Planning to implement ER under PILOT SEA TO AIR project. Planning to implement elogbooks for the entire fishery.
Hawaii Shallow-set longline	Daily longline and transshipment logbooks State Dealer reports Observer data **VMS required**	Previous e-log trials were successful. ER is feasible for the longline fishery and is currently being developed for implementation.	Video monitoring was previously tested but not further pursued at this time. Should review current EM longline trials in Australia and the Solomon Islands to ascertain the potential application to the Hawaii longline fishery.	138 vessels permitted for longlining. Planning to implement ER under PILOT SEA TO AIR project. Planning to implement elogbooks for the entire fishery.

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
Hawaii Non-longline commercial pelagic (troll, handline and shortline)	**State of Hawaii fishing reports**, creel survey for non-commercial	Vessel sizes range from small trailer vessels to large moored vessels. Use HDAR's web-based ER system.	Fleet numbers in the thousands and sizes of the majority of the local vessels are not adequate for EM units. EM would not be cost effective nor feasible.	Three vessels are federally permitted.
Hawaii Precious Corals	Logbooks for Federally permitted vessels, **State of Hawaii fishing reports for state licensees**	Use HDAR's web-based ER system.	Very few participants (1) therefore not cost effective nor feasible.	Harvest by hand and diving gear. One permit issued.
Hawaii Bottomfish	Non-commercial: paper trip report by mail to PIFSC and creel survey Commercial: **State of Hawaii Dealer reports**	Use HDAR's web-based ER system.	Sizes of the majority of the local vessels are not adequate for EM units. EM would not be cost effective nor feasible.	
Western Pacific Squid Jig	Logbook for Federally permitted vessels, creel survey, or **State of Hawaii fishing reports**, depending on location of fishermen and local requirements	Generally large sized vessels, but very few participants (zero). Some small vessels in state waters.	Very few participants (zero), therefore not cost effective nor feasible.	No federal permits issued.

Fishery	Current Data collection method (ER/EM are bold.)	ER Capabilities/ limitations	EM Capabilities/ limitations	Notes
Western Pacific Purse Seine	**VMS required.** **Regional Purse Seine Logbooks. Vessels have the capability for elogbooks.** Forum Fisheries Agency-deployed observer on all fishing trips between 20 degrees N and 20 degrees S. **Discard reporting by FAX or email**. Report catch and net sharing on Regional purse Seine logsheets.	Generally large vessels with infrastructure to support computer and communication equipment for ER.	VMS used on all vessels.	37 vessels are in the 2015 fishery with most volunteering to use elogbooks.

Current Pacific Islands Regional Efforts to develop ER

PIR has an eReporting working group of representatives from SFD, PIFSC, the Observer Program, OLE and the Council that periodically meets to determine how to implement ER for PIR fisheries. The committee is developing a "phased-timeline" that is dependent on both the observer data/VMS project and the elogbook project. This phased timeline will allow the agency to transition from current methods to electronic methods gradually, minimizing issues. These phases will consist of:

- Building the necessary infrastructure (both personnel and framework) and engaging relevant stockholders,
- Beta-testing the ER/EM methods, and
- Gradually implementing ER/EM with the goal to become paperless, or as near to paperless as possible.

The PIRO Observer program is implementing the PILOT SEA TO AIR pilot project for ER using VMS units for transmitting data from the vessels. This project is in coordination with the Council's elogbook project and with the NOAA OLE's life-cycle replacement program for VMS units for vessels in the Hawaii and American Samoa longline vessel fleets. The Observer Program will supply the tablets used by observers and satellite transmission in the PILOT SEA TO AIR project. VMS would be used to securely transmit the observer data and logbook information to authorized users. Under these projects, vessel captains will use a tablet interface to transmit fishing logbooks via the vessel's permanently installed VMS unit, and the observers will be using a portable VMS unit completely separate from the vessel's VMS to transmit the observer data.

The Council, in partnership with PIFSC, PIRO SFD, PIRO Observer program, and NOAA OLE has initiated an ER project to supply the entire Hawaii longline fleet (~140 vessels) with new VMS units and tablet computers equipped with ER software. The tablet computers are interfaced with the VMS units by Bluetooth technology. Captains will use the tablet computers to send daily logbook information through the VMS unit via satellite to NMFS PIFSC.

Both of these projects will save time for observers, fishermen, and NMFS, improve data accuracy, and improve the tracking of catch quotas. Implementation of electronic reporting for both the observer and logbook information is scheduled for 2015. An ER implementation plan specific to the results of the PILOT SEA TO AIR and elogbook projects is being developed by the Observer Program in coordination with the Council, PIFSC, and OLE. Funding of the future ER program is anticipated from the Fisheries Information System program. This plan is designed to transition from current (primarily manual) data collection and processing methods to electronic methods in a phased-time-line to use an "adaptive strategy" of implementation that scales up gradually to minimize impediments to progress and failure.

In 2013, the Council provided funding to the WCPFC Secretariat to examine the use of elogbooks and video monitoring for fisheries in the Western and Central Pacific Fisheries Convention Area. The project included:

- gathering information on ER and EM programs and tools and regional reporting on scientific and management perspective,
- Coordinating workshops to determine best approaches for ER and EM
- Design and implement pilot projects for ER and EM implementation
- Develop standards and protocols for WCPFC members for submitting electronic data.

At its 11th Regular Session of the WCPFC held in December 2014, the WCPFC agreed to the establishment of the WCPFC Electronic Technologies Working Group that will, among other things, address the issues listed above. Representatives of the Council and NMFS will participate in this international working group.

Information on the development of ER for the U.S. purse seine fishery is in Appendix A.

Implementing EM

VMS is currently required for vessels in the Hawaii longline, American Samoa longline (vessel size Class C or D), Crustacean Permit Area 1 VMS Subarea, and the CNMI commercial bottomfish fishery (medium or large bottomfish vessels). Any expansion of VMS requirements to other fisheries would need to consider the management purpose of having the VMS data (i.e., compliance with closure areas). As management measures are developed for these domestic fisheries, the use of VMS to facilitate management should be considered, as appropriate. VMS is also currently required for U.S. vessels participating in international fisheries such as the U. S. purse seine fishery. The Council and NMFS will continue to evaluate the effectiveness and practically of implementing video monitoring in PIR fisheries (e.g., purse seine and albacore troll fisheries).

Information on the development of EM for the U.S. purse seine fishery is in Appendix A.

Costs

Estimating costs for future ER/EM is difficult due to evaluating fisheries that are the best candidates for further ER/EM development and the cost structure (e.g., FTEs, hardware, software and transmission) associated with these fisheries. Costs of pilot programs and implementation costs would depend on the type of technology, the number of fishery participants, transmission frequency, and data management needs. It is also unknown whether these costs would be covered by fishery participants or by the agency (as in the case for VMS in the longline fisheries) or a combination of both. There is no industry cost-sharing for ER/EM in the PIR at this time, and NOAA does not anticipate that industry cost-recovery would be available in the future for any domestic fisheries. There is likely to be resistance from stakeholders to implementing additional ER and EM unless the agency provides the service at no or minimal cost, as there is no cost-recovery mechanism in the PIR.

Table 2 illustrates the costs for ER/EM in the Hawaii longline fisheries using VMS to securely transmit observer and logbook information from the fishing vessel.

Table 2. Costs for ER/EM for the Hawaii longline fisheries based on FY14 funding provided by a partnership of Council, PIFSC, PIRO Observer program, and NOAA OLE.

Item	Cost
Hardware – Thorium VMS/ER tablet. 140 units	$251,860
Thorium Observer System tablet and transceiver. 60 units	$117,000
Application development. Fishing forms, observer forms and Forms Viewer Program	$86,400
Equipment installation	$68,700
Satellite service and support for one (1) year	$134,316
Total	$658,276

Hawaii and American Samoa longline fisheries and U. S. Purse Seine Fishery – Budget and staffing needs.

The provisional annual cost for satellite service for PIFSC (Hawaii longline logbook), PIRO Observer Program (transmit observer data in Hawaii and A. Samoa longline fisheries), and NOAA OLE (VMS) is $134,316. It should be emphasized that the estimate is provisional and a more accurate annual estimate will be possible in 2016 after the initial ER implementation year (2015).

Staffing needs are similarly difficult to estimate. We expect a surge in labor requirements for the ER implementation phase. The three entities can manage their portion of the ER project by re-prioritizing existing FTEs during the implementation phase. Costs will be partially offset to some extent by efficiencies achieved by ER implementation such as reducing or eliminating manual keypunching of data. In the longer-term, the necessity of additional FTEs will be identified after the implementation phase.

PIFSC costs to maintain and process ER for the Hawaii longline fisheries is estimated as 2.0 FTEs (~$300,000). Implementation of ER for American Samoa longline fisheries is 0.5 FTE ($75,000).

PIRO Observer Program costs will depend on the ability to shift duties of current staff and to hire additional staff. A workshop is scheduled in 2015 to understand and plan for staffing needs to implement electronic reporting by observers and to understand the changes that will be needed to debrief observers using electronic reporting. The FTEs necessary to manage the program would include staffing to maintain and install the equipment, database management staff, and technical assistance staff. Some of the current database management duties including logbook entry into the fisheries database could be shifted to management of the electronic information received by the agency. Staff would need to be available to interface between the ER/EM

vendors, vessel operators and recipients of the data. The volume of data would determine how many FTEs to receive and conduct QA/QC on the data before it can be used for management purposes.

OLE's VMS-related hardware/software future costs are likely to be relatively small, since the OLE will replace VMS units in both Hawaii and A Samoa in 2015 under its existing "VMS lifecycle management" program. While future costs don't represent "no cost", substantial costs have already been incurred by replacing VMS units.

Staffing needs and costs to implement EM on longline fisheries are similarly difficult to estimate. A pilot project is envisaged where video electronic systems are installed on longline vessels to document catch and bycatch with simultaneous catch estimation by an observer. At-sea observer estimates would be compared by video estimation of catch by observers that are not deployed on a vessel to assess accuracy and bias from the two methods. A pilot project for EM in a Pacific Island longline fishery had equipment costs of $15,000 per vessel for hardware and installation. Cost to process EM data for a pilot project is 1.0 FTE ($150,000) per year.

Cost for implementing ER for the U.S. purse seine fishery in the western Pacific Ocean depends on the ability for cost-recovery for equipment and transmissions of the vessels active in the fishery. Based on 40 vessels participating in 2014 in the fishery, the annual cost for transmission is approximately $16,800 (40 vessels x $420). Equipment cost is approximately $76,600 (40 vessels x $1,915 for tablets and software). Cost to maintain and process ER for the purse seine fishery is 1.0 FTE ($150,000).

Regulatory Changes

Regulations that may need to be changed to implement ER or EM are in 50 CFR 665.14 Reporting and Recordkeeping and at 50 CFR 665.19 for Vessel Monitoring Systems. The current language in 50 CFR 665.14 provides the flexibility to establish ER without changing the regulations unless more descriptive regulations are needed. If VMS is applied to additional fisheries, the regulations would need to be amended to include the additional fisheries. If the responsibility for purchasing and operating VMS is shifted to the fishery participants, the regulations would need to be changed to reflect that. Any new EM technology requirements (e.g., use of video) would need to be added to the 50 CFR part 665 regulations.

With any regulatory changes to implement ER or EM, a Paperwork Reduction Act approval from the Office of Management and Budget (OMB) would be required. This approval may be limited to a modification of current data collection approvals or may be a new approval. The agency would not be able to implement changes to data collection requirements without OMB's approval.

Potential regulatory changes to implement ER and EM in the U.S. purse seine fishery is described in Appendix A.

Proposed ER/EM implementation and evaluation method

Possible steps for the Council, PIRO, and PIFSC to implement and evaluate EM or ER for the fisheries are listed below.

1. Review the use of ER/EM in other small scale fisheries (Solomon Islands and Australia or in other regions of the US) to identify other technologies that could be used for PIR fisheries.
2. Collaborate with fishery participants to identify PIR fisheries that would be reasonable (based on management needs and nature of fishery) for applying ER or EM, and prioritize development of ER or EM by fishery. Use the questions in the Future Directions section of this document to identify and prioritize candidate fisheries. This may include holding public workshop(s) on ER/EM capabilities to generate interest among stakeholders, including fishermen, State, and territorial fisheries managers.
3. Work together to select a fishery or fisheries to implement ER or EM based on capabilities and public input.
4. Continue evaluating ER or EM data needs for the selected fishery and equipment/software capabilities by vessels and location. (Shore-based vs vessel-based).
5. Do preliminary evaluation of agency equipment/software capabilities and needs to receive and process data. May include interface with State or territory.
6. Based on preliminary assessment, work further with stakeholders (database system managers and data users) to select test case fishery for ER or EM.
7. Work with stakeholders and partners (e. g., fishermen, State, and territories) to develop pilot project.
8. Use pilot project to beta test ER or EM.
9. Develop and implement criteria for evaluating successes and failures, for example:
    a. Could the crew/captain properly and easily operate the equipment?
    b. Did the equipment operate under normal fishing conditions?
    c. Did the vessel platform work for the technology (space, power, etc.)?
    d. Could the information be useful for fisheries management based on the data and timing of the transmissions?
    e. Were there any software or hardware issues on the sending or receiving ends?

f. Can the software provide the reporting necessary for fisheries management in a timely manner?

10. Determine next steps including if further development and implementation are desired. Can identified problems be fixed or should other technologies be considered?

11. Report the results to the Council for guidance and further recommendations.

Timeline for implementation of regional ER/EM plan

Years 1-5

The first priorities for the PIRO and PIFSC for ER are for the Hawaii longline fisheries due to the WCPFC and IATTC catch limits and participation needs in this fishery. Making ER possible for this fishery in the next 1-2 years would allow for better confidence in fisheries management, and reducing the potential for exceeding the RFMO catch limits. These fisheries are closed when PIFSC predicts that the RFMO catch limits may be reached. Having more timely and accurate data would allow for harvest during the year closer to the catch limit, without exceeding the catch limit. The second priority fishery for ER/EM implementation in the next 1-2 years would be the American Samoa longline fishery due to the similarity to the information handled in the Hawaii longline fisheries.

Years 5-10

Applying ER/EM to the other PIRO-managed fisheries would be in the 5-10 year time period as there are fewer participants, less data needs, and smaller vessels with much less income to justify the expense of developing ER/EM programs. Working with the local jurisdictions to develop ER as appropriate is also a priority within the 5-10 year period.

Table 3 contains the potential fisheries, activities, and timing for implementation of any new ER or EM. These activities are not detailed and would be greatly dependent on Council recommendations and participation in the development. The successes and experiences with implementing the PILOT SEA TO AIR and elogbook projects for the Hawaii and American Samoa longline fisheries would provide information to base future implementation of ER/EM in other fisheries.

Table 3. Timeline for Potential Future PIR ER/EM Activities

Activities	Estimated Date
Implement ER for Hawaii Longline Fisheries (elogbooks, PILOT SEA TO AIR and VMS replacement)	2015–2016
Implement ER for American Samoa Longline Fisheries (PILOT SEA TO AIR and VMS replacement)	2015–2016
Develop U.S. Purse Seine ER capabilities	2015–2017
Further evaluate Hawaii fisheries to identify candidates for further consideration for ER	2017

Implement American Samoa longline fisheries for elogbooks, expanding on the experience with the Hawaii longline fisheries	2016-2017
Investigate the use of ER/EM for other PIRO-managed fisheries, based on experience with Hawaii and American Samoa fisheries	2018–2025
Develop EM capabilities for longline and purse seine fisheries	2019–2025

References

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Appendix A

South Pacific purse seine fishery electronic reporting and electronic monitoring

The South Pacific Tuna Treaty (SPTT) is a multi-lateral treaty that since 1988 has provided U.S. purse seine vessels fishing access to the exclusive economic zones (EEZs) of 16 Pacific Island countries. The treaty currently provides access for up to 45 vessels, with 5 licenses reserved for joint venture vessels[5]. In 2014, 40 vessels held SPTT licenses, and as of January 2015, 37 vessels held SPTT licenses for calendar year 2015. It is the largest U.S. distant-water fishery. The fishery is administered and managed by the NMFS PIRO, primarily under the authorities of the South Pacific Tuna Act and the Western and Central Pacific Fisheries Convention Implementation Act (WCPFCIA). Because it is not managed under an MSA fishery management plan but has potential electronic technology issues, NMFS PIRO includes information about this fishery as an appendix to the 2015 Pacific Islands Region Electronic Reporting and Electronic Monitoring Implementation Plan.

U.S. purse seine vessels operating in the western and central Pacific Ocean (WCPO) have a number of reporting requirements under domestic regulations implementing the SPTT as well as regulations under the WCPFCIA and the High Seas Fishing Compliance Act. Recently, there has been a regional international initiative to develop and implement electronic reporting (ER) and electronic monitoring (EM) for the purse seine fishery. This section describes efforts to develop ER for SPTT reporting purposes and efforts to develop ER and EM more broadly for the WCPO by the Western and Central Pacific Fisheries Commission (WCPFC), the regional fisheries management organization responsible for managing highly migratory species in the WCPO. In this context although domestic actions may have impact on the purse seine fishery with regard to ER and EM, multinational actions and initiatives have greater practical impact on this fishery.

For more than 25 years the various reporting requirements for vessels operating under the SPTT have been facilitated and monitored by a NMFS field station located in Pago Pago, American Samoa. For many years Pago Pago was the main landing site for much of the U.S. WCPO purse seine fleet (accounting for more than 85% of landings). It was at this location that Pacific Islands Forum Fisheries Agency (FFA) observers embarked and disembarked, daily logsheets were collected, and species composition and length frequency data were collected by NMFS port samplers, along with unloading and final landing determinations. Beginning in about 2010, some of the participants in the fleet developed a new business model that involved more

[5] The SPTT fishery may be considered the largest sector managed and administered by the NMFS PIRO. For instance, if an ex-vessel landings value metric is applied, (although the price of fish is highly variable) the fishery's 2013 landings were close to $600 million in value. If for this exercise a more appropriate metric of a fishery's size is the amount of data it generates, then the 40 vessels in the SPTT fishery, which make about 8,000 sets and catch about 250,000 metric tons of fish each year, may still be considered a large fishery. Vessel operators generate a large amount of information in the form of daily logbooks, EEZ entry and exit reports, transshipment and unloading reports, discard reports, and other reports etc., and the vessel observer program (100% observer coverage) and satellite-based vessel monitoring program generate lots more, and the fishery produces equal or more data than the Hawaii-based longline fishery.

transshipping (in port), allowing more fishing effort to occur in the western part of the fishing grounds, and the transshipped fish delivered to canneries in Thailand. This shift in fishing patterns has created the need for a geographically wider expanse in fishery monitoring activities, which has made the case for ER and EM more compelling.

Under the SPTT, vessels are required to record their daily catch and activities in logbooks. In the last two years, two software systems, eTUNALOG and iFIMS, have been developed to electronically record entries in the logbooks, as well as to transmit the data as needed. Although the SPTT as currently written requires vessels to submit paper logbooks to the FFA, located in Honiara, Solomon Islands, it is anticipated that revisions to the SPTT will allow for electronic submission. For instance, eTUNALOG, developed by the Secretariat of the Pacific Community Oceanic Fisheries Programme (SPC OFP), is a free software system designed to allow vessel operators to electronically enter their logbook information. Operators can export data from a trip in an XML file that can be uploaded into a database, eliminating labor-intensive keypunching. In 2014, 14 vessels, or more than one third of the fleet, beta-tested eTUNALOG for at least one fishing trip. The other system is iFIMS, developed by Quick Access Computing, located in Australia. This software, which is required to be used when fishing in the EEZs of several Pacific Island countries, is a paid subscription service that also allows vessels to electronically record and submit logbook information. As of January 31, 2015, almost 90 percent of the U.S. purse seine fleet had signed up for iFIMS and has access to the electronic logbook and other ER capabilities in iFIMS.

While these technological developments have facilitated logbook capabilities for vessel operators, they also have the potential to help management entities monitor the fleet's fishing effort on a near-real-time basis. In 2013, the SPTT transitioned from a license-based system to a one based on a limited number of available fishing days. The fleet is limited to a set number of fishing days per an agreed period. iFIMS was designed to help the Pacific Island countries monitor use of fishing days, as well as non-fishing days by vessels operating in their waters. Although iFIMS was initially designed to track fishing days, Quick Access Computing believed that many reporting elements were ripe for ER, and developed iFIMS such that vessels have the ability to electronically lodge non-fishing day requests (as part of the fishing-day scheme under the SPTT) as well as electronically report vessel entries and exits through EEZs, logbook data, transshipment data, and unloading data.

NMFS PIRO International Fisheries Division has been working with the developers of both eTUNALOG and iFIMS to ensure that any electronic reports generated from these systems meet domestic reporting requirements. Additionally, NMFS is moving its SPTT data to a new database and intends to design the system to allow for easy upload and integration of electronic reports, and if appropriate in the future, EM data. This transition involves moving data management responsibilities from the NMFS West Coast Office to the Pacific Islands Fisheries Science Center, in Honolulu.

Apart from the SPTT, EM and ER capabilities are developing more broadly in the WCPO, and many nations are now implementing a variety of systems. To begin to harmonize all the various in-country initiatives, the WCPFC held a workshop in March 2014 to discuss their potential uses and applications. The workshop came up with a number of recommendations, including the need

to further consider the application of EM and ER in the WCPO, with particular emphasis on data standards (see: http://www.wcpfc.int/meetings/e-monitoring-and-e-reporting-workshop). At the WCPFC annual meeting in December 2014, the WCPFC established an EM/ER working group with the objective of considering how EM and ER technologies could benefit the WCPFC and its members. Terms of references for the group were established, one task of which is to draft standards on ER and to develop an EM and ER strategy for the WCPFC. It is not expected that that group will create rigid standards in terms of the operations of the various electronic systems, but rather develop protocols such that the WCPFC and its data provider (the SPC OFP) can accept reporting in a timely and orderly fashion (see: http://www.wcpfc.int/system/files/WCPFC11%20draft%20summary%20report%20WCPFC11%20final%20draft%20as%20at%2021%20Dec%202014_with%20attachments.pdf at paragraph 502).

The United States is expected to be an active participant in the deliberations of the EM/ER working group. Given our current international data reporting responsibilities and the interaction with our international partners in fisheries management, it will be important that systems established domestically are capable of providing data in the manners and formats adopted by the WCPFC.